FIG.1

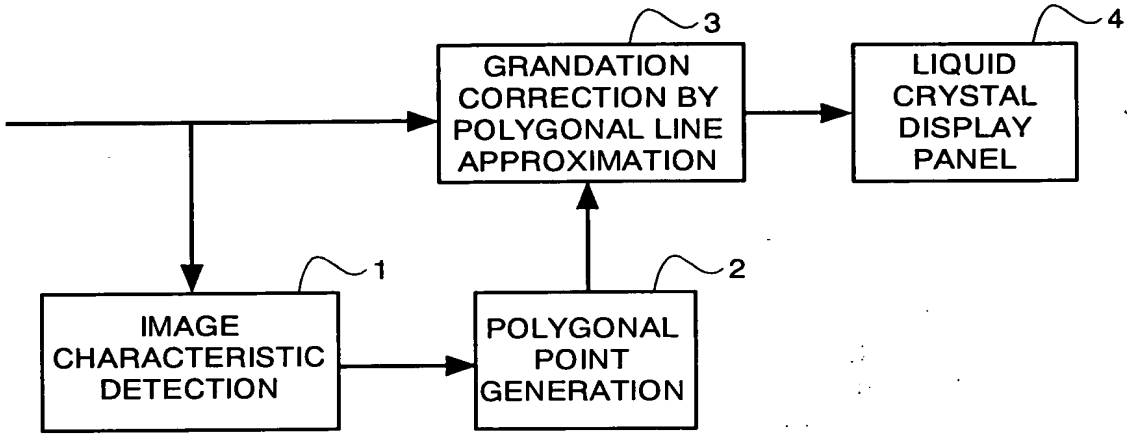


FIG.2

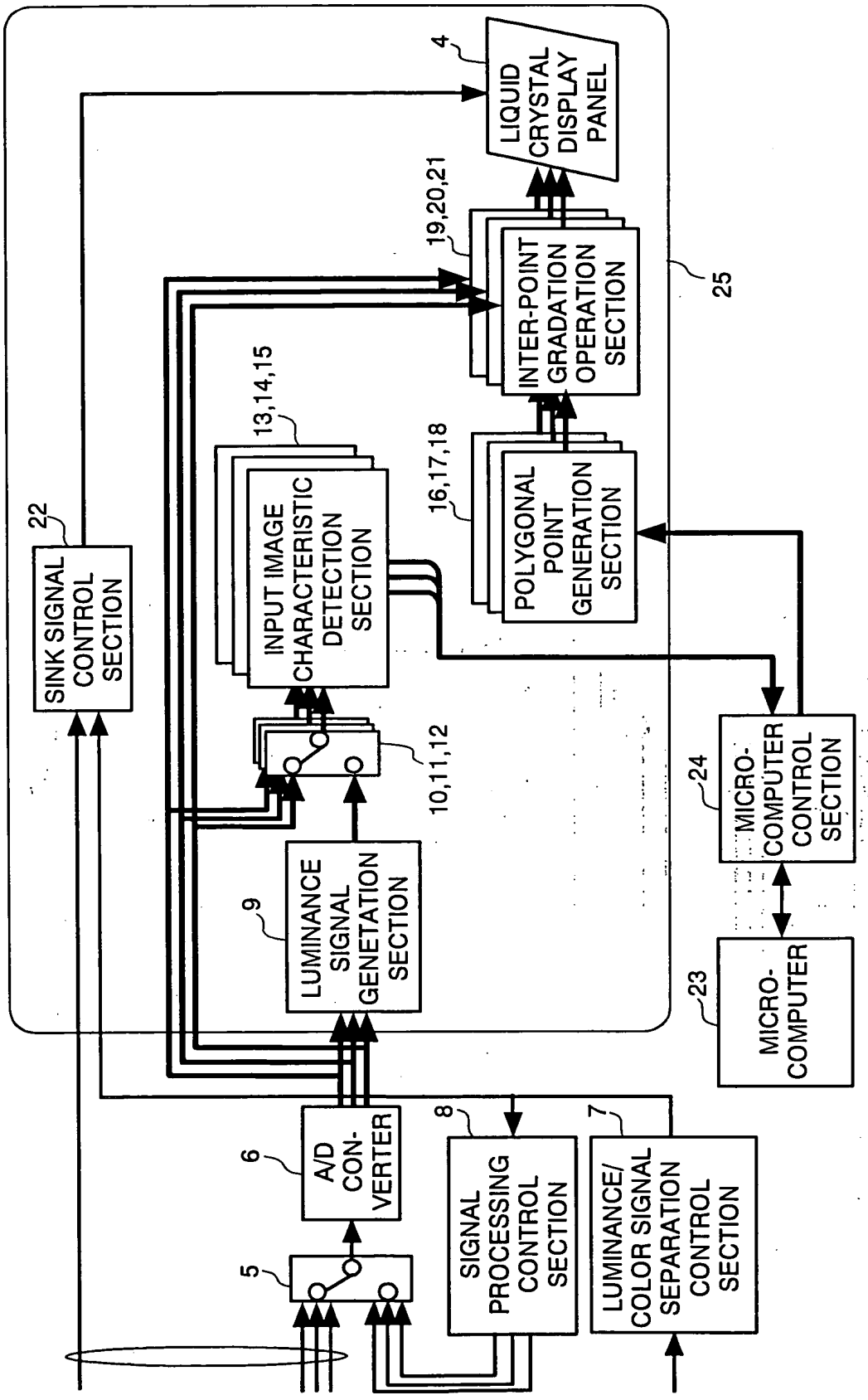
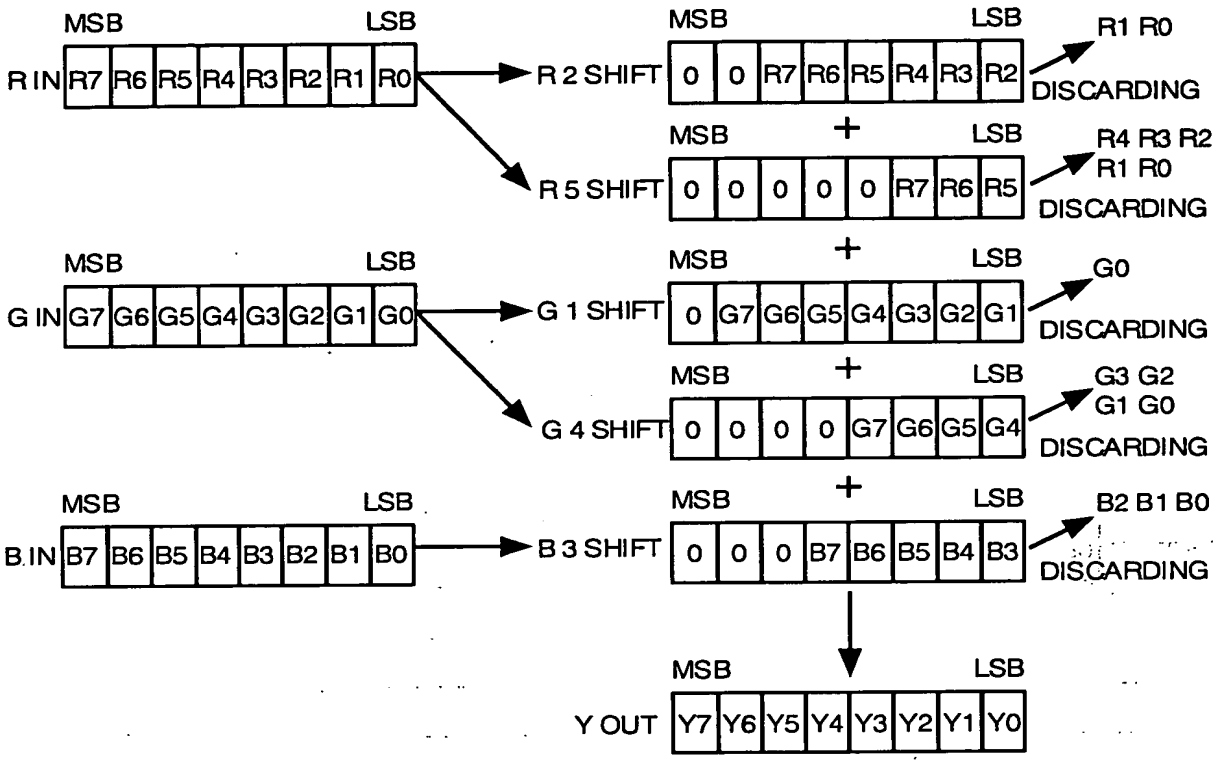

LIQUID CRYSTAL DISPLAY PANEL
4
19,20,21
INTER-POINT GRADATION OPERATION SECTION
25
13,14,15
INPUT IMAGE CHARACTERISTIC DETECTION SECTION
16,17,18
POLYGONAL POINT GENERATION SECTION
22
SINK SIGNAL CONTROL SECTION
10,11,12
24
MICRO-COMPUTER CONTROL SECTION
9
LUMINANCE SIGNAL GENETATION SECTION
23
MICRO-COMPUTER
6
A/D CON-VERTER
8
SIGNAL PROCESSING CONTROL SECTION
7
LUMINANCE/ COLOR SIGNAL SEPARATION CONTROL SECTION
5

FIG.3



Y OUT = 0.299 * R + 0.587 * G + 0.114 * B

↓ APPROXIMATION PROCESSING

Y OUT = 0.281 * R + 0.563 * G + 0.151 * B

FIG.4

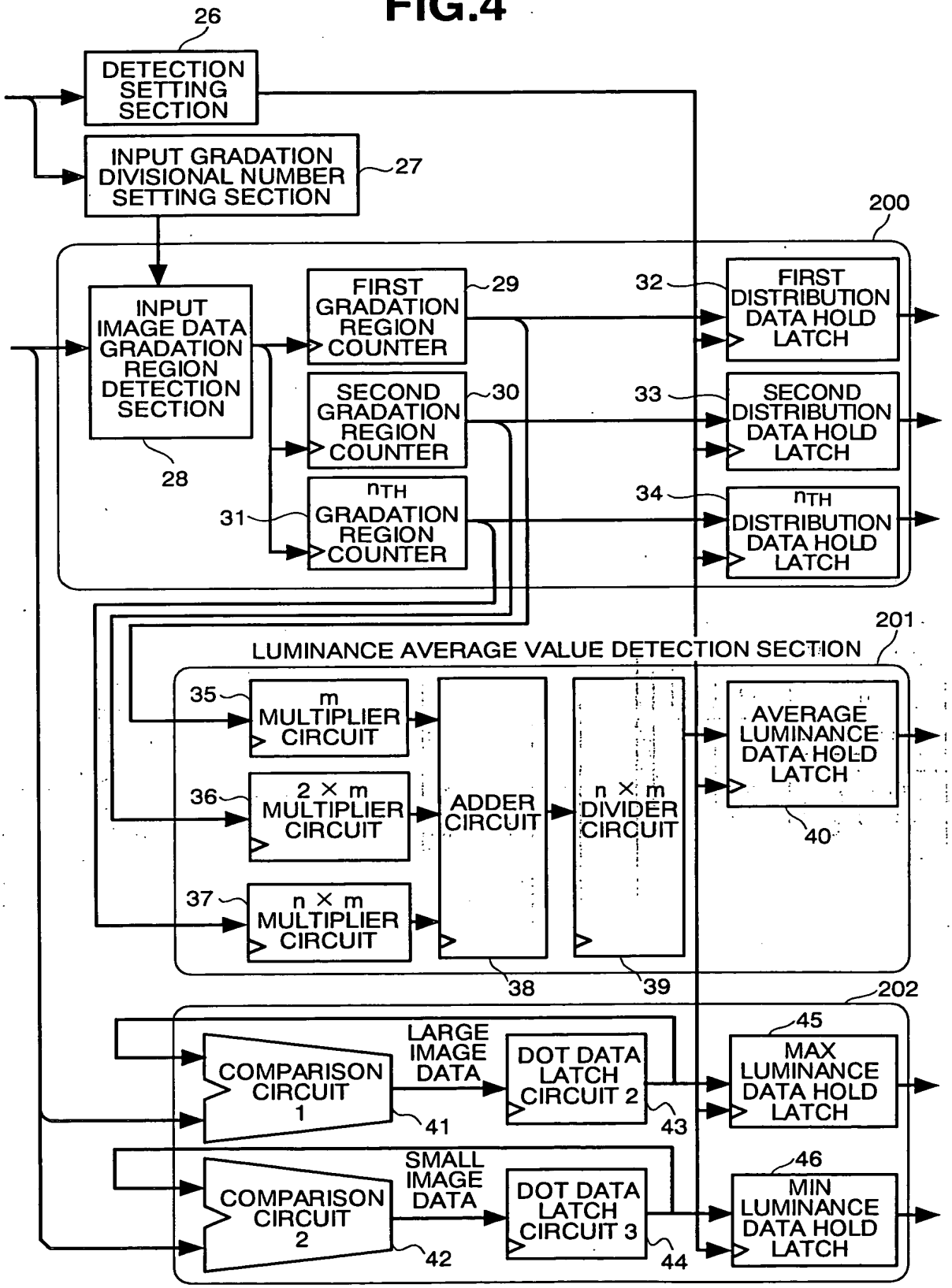

26
DETECTION SETTING SECTION
INPUT GRADATION DIVISIONAL NUMBER SETTING SECTION
27
200
INPUT IMAGE DATA GRADATION REGION DETECTION SECTION
28
FIRST GRADATION REGION COUNTER
29
SECOND GRADATION REGION COUNTER
30
nTH GRADATION REGION COUNTER
31
32
FIRST DISTRIBUTION DATA HOLD LATCH
33
SECOND DISTRIBUTION DATA HOLD LATCH
34
nTH DISTRIBUTION DATA HOLD LATCH
201
LUMINANCE AVERAGE VALUE DETECTION SECTION
35
m MULTIPLIER CIRCUIT
36
2 × m MULTIPLIER CIRCUIT
37
n × m MULTIPLIER CIRCUIT
ADDER CIRCUIT
38
n × m DIVIDER CIRCUIT
39
AVERAGE LUMINANCE DATA HOLD LATCH
40
202
COMPARISON CIRCUIT 1
LARGE IMAGE DATA
41
DOT DATA LATCH CIRCUIT 2
43
45
MAX LUMINANCE DATA HOLD LATCH
COMPARISON CIRCUIT 2
SMALL IMAGE DATA
42
DOT DATA LATCH CIRCUIT 3
44
46
MIN LUMINANCE DATA HOLD LATCH

FIG.5

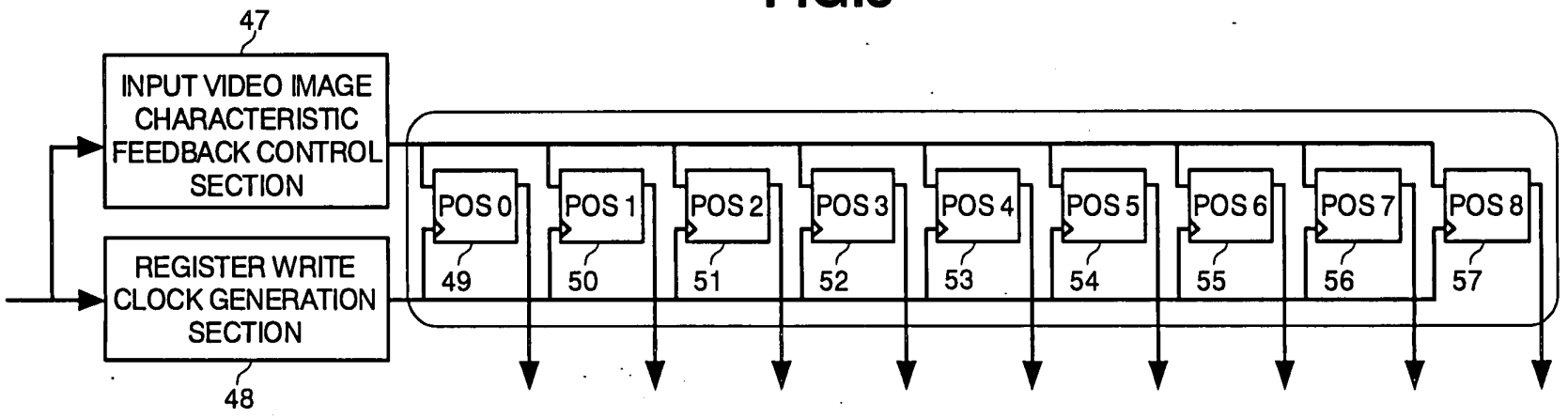


FIG.6

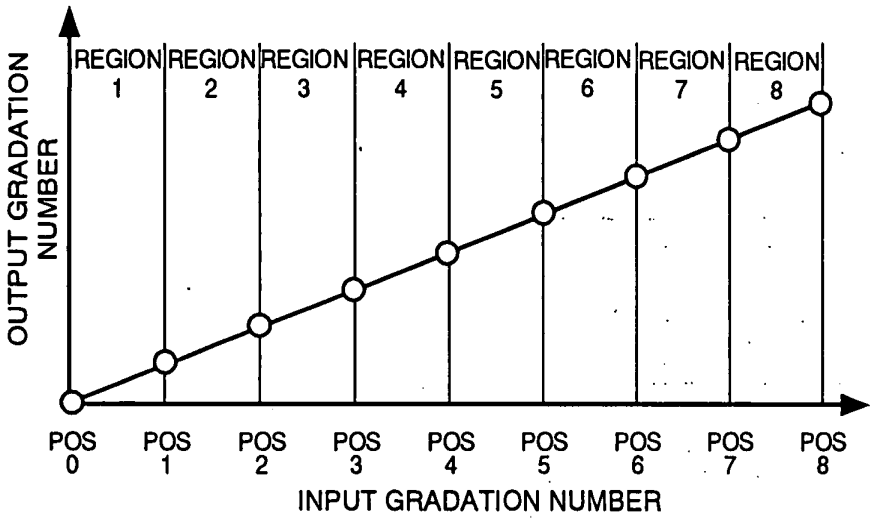
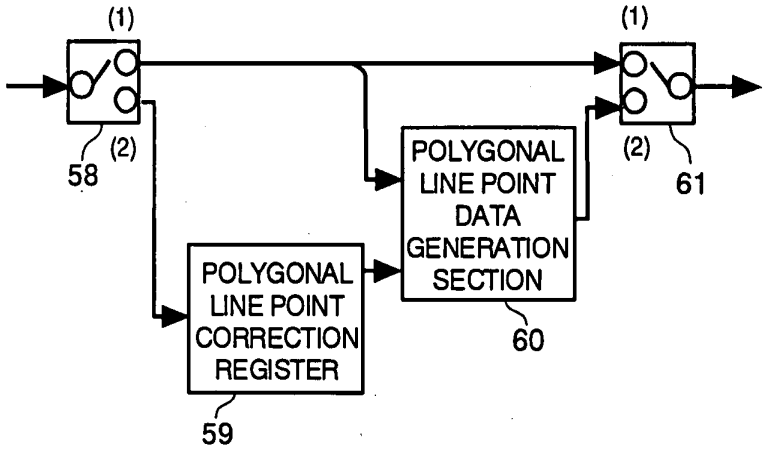


FIG.7



5/21

FIG.8

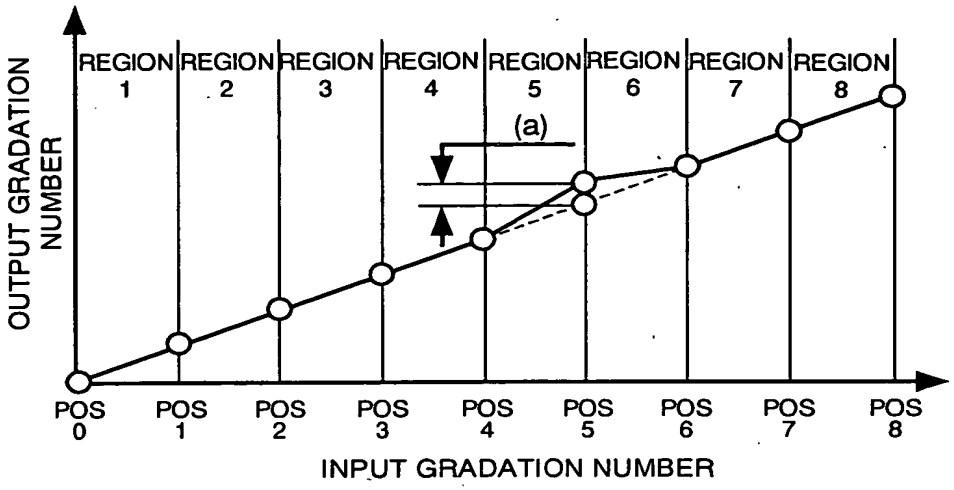


FIG.9

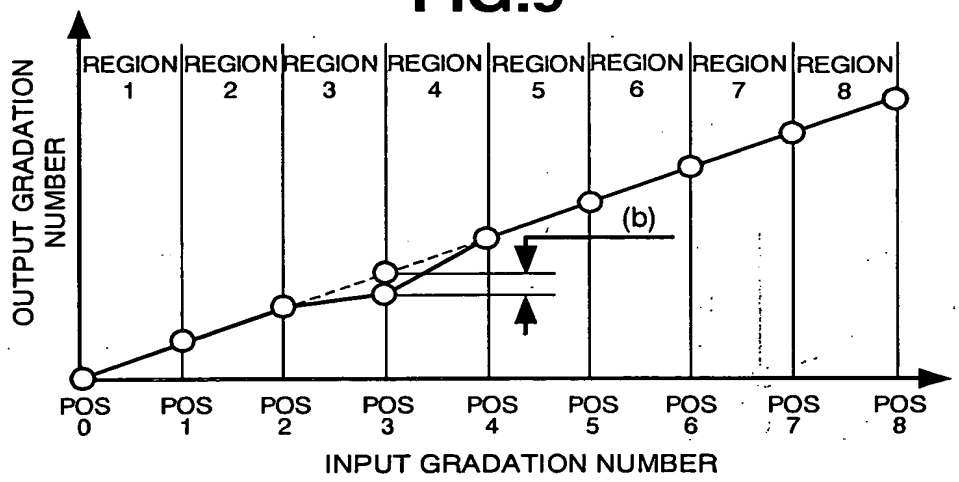


FIG.10

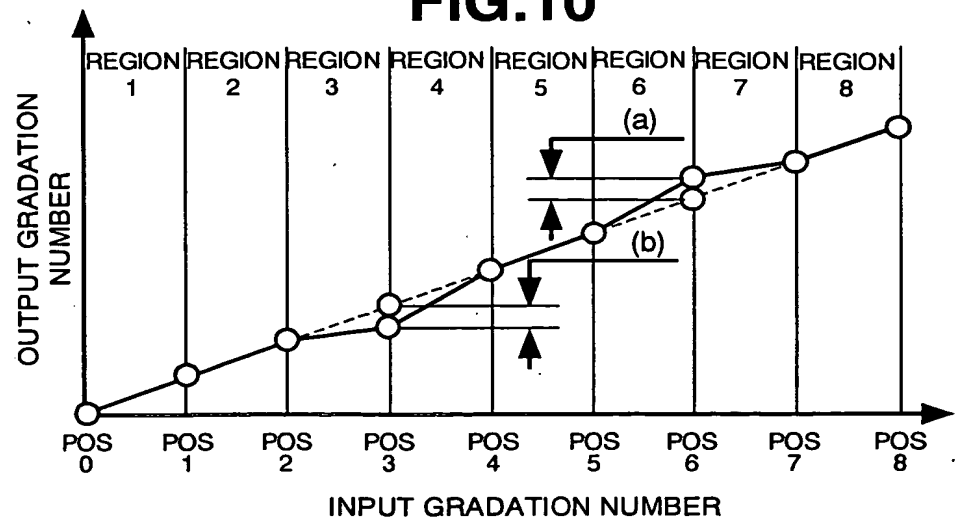


FIG.11

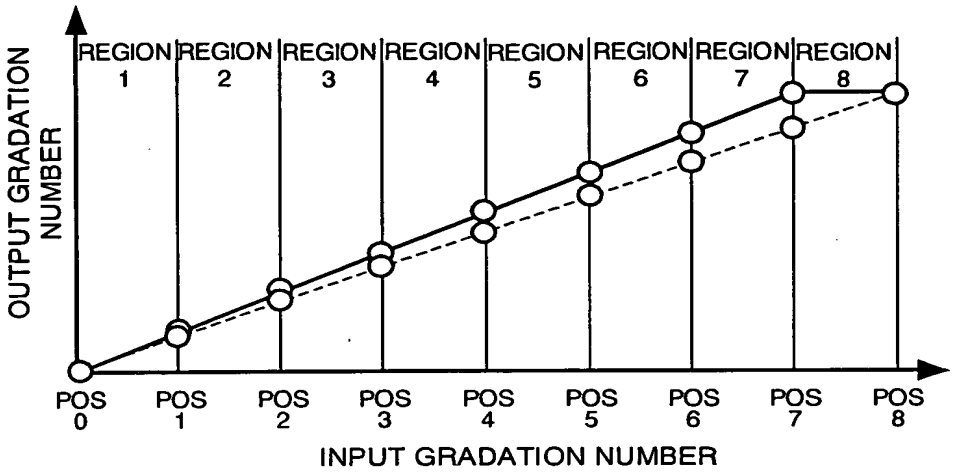

REGION 1
REGION 2
REGION 3
REGION 4
REGION 5
REGION 6
REGION 7
REGION 8
OUTPUT GRADATION NUMBER
POS 0
POS 1
POS 2
POS 3
POS 4
POS 5
POS 6
POS 7
POS 8
INPUT GRADATION NUMBER

FIG.12

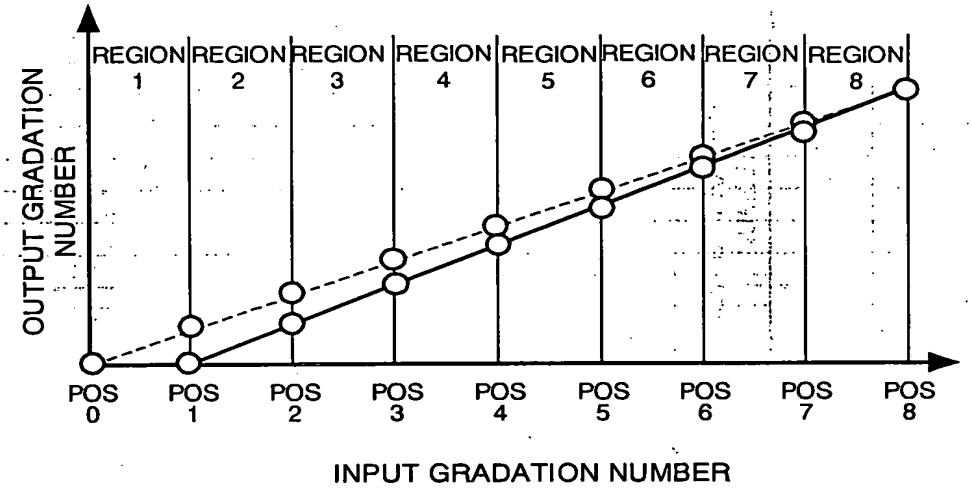

REGION 1
REGION 2
REGION 3
REGION 4
REGION 5
REGION 6
REGION 7
REGION 8
OUTPUT GRADATION NUMBER
POS 0
POS 1
POS 2
POS 3
POS 4
POS 5
POS 6
POS 7
POS 8
INPUT GRADATION NUMBER

FIG.13

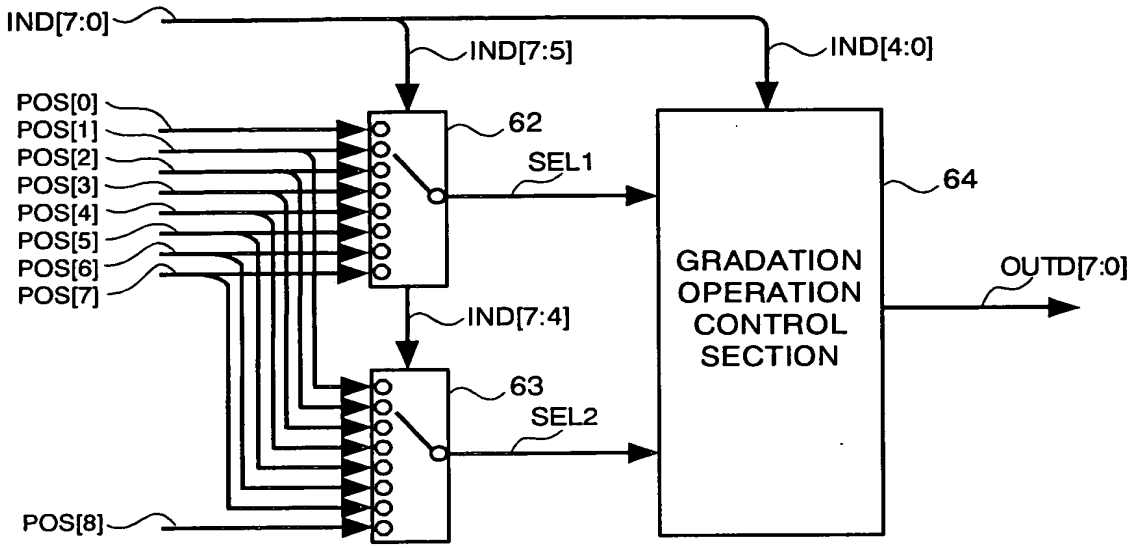

IND[7:0]
IND[7:5]
IND[4:0]
POS[0]
POS[1]
POS[2]
POS[3]
POS[4]
POS[5]
POS[6]
POS[7]
62
SEL1
64
GRADATION OPERATION CONTROL SECTION
OUTD[7:0]
IND[7:4]
63
SEL2
POS[8]

FIG.14

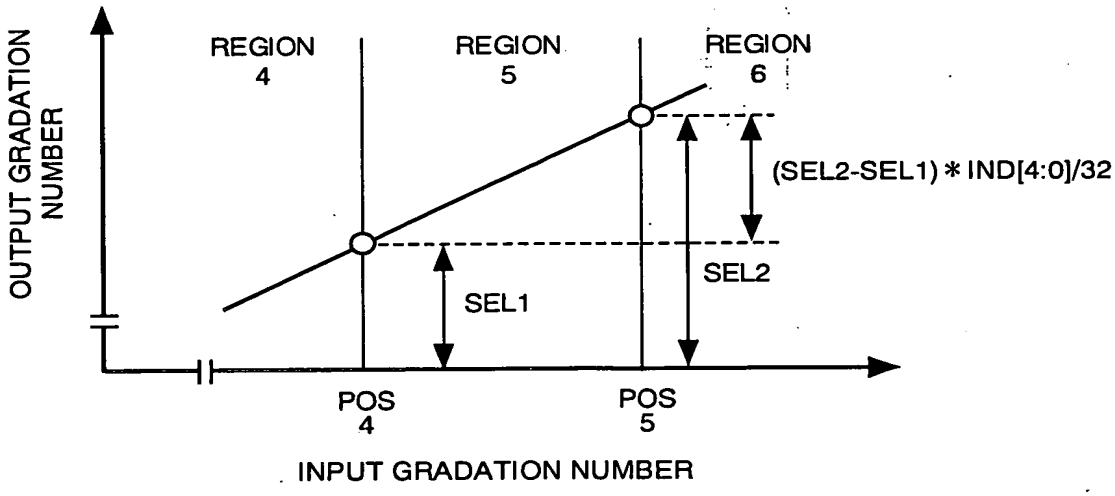

OUTPUT GRADATION NUMBER
REGION 4
REGION 5
REGION 6
(SEL2-SEL1) * IND[4:0]/32
SEL2
SEL1
POS 4
POS 5
INPUT GRADATION NUMBER

FIG.15

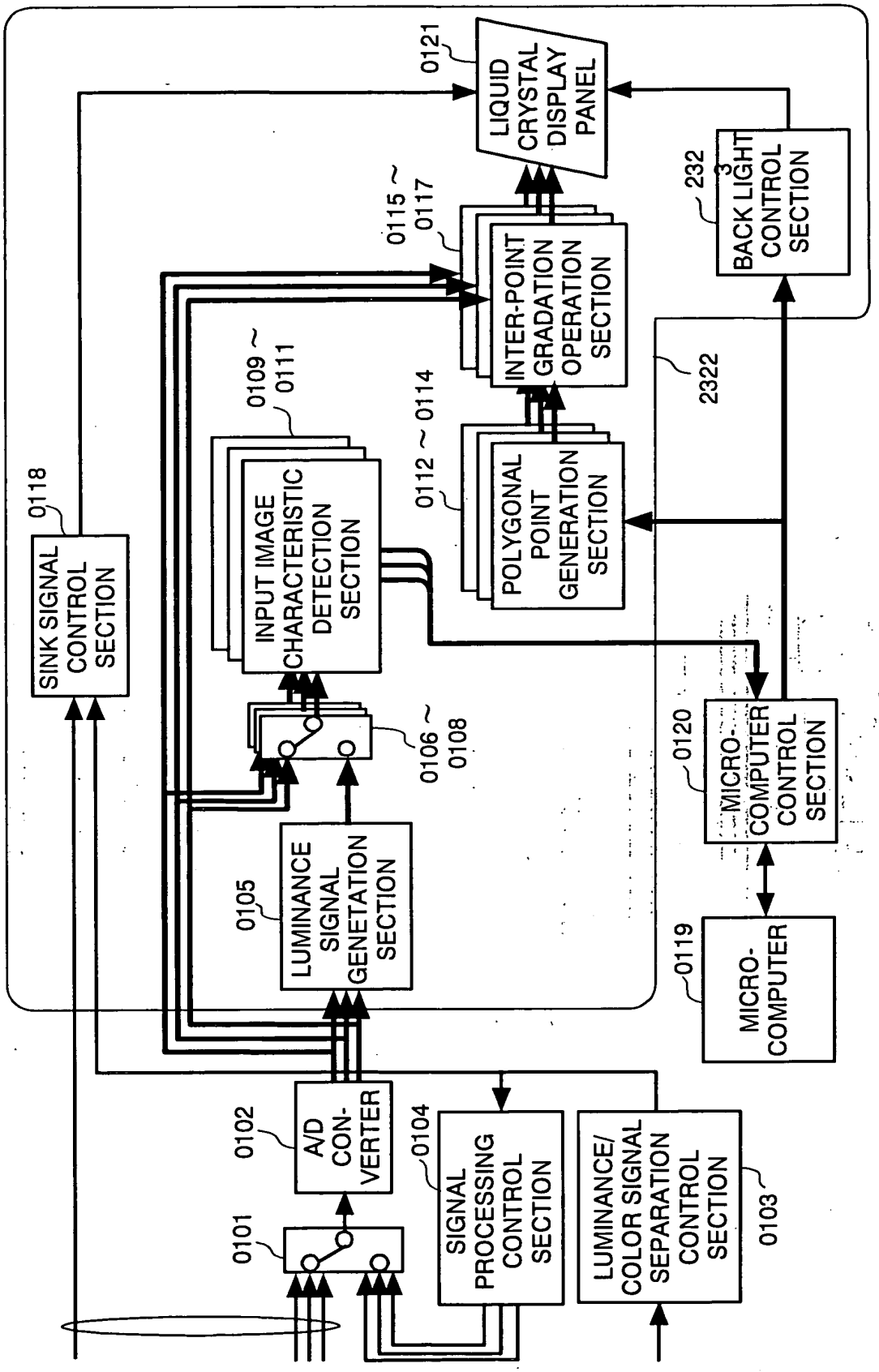

LIQUID CRYSTAL DISPLAY PANEL
0121
INTER-POINT GRADATION OPERATION SECTION
0115 ~ 0117
BACK LIGHT CONTROL SECTION
232
3
2322
SINK SIGNAL CONTROL SECTION
0118
INPUT IMAGE CHARACTERISTIC DETECTION SECTION
0109 ~ 0111
POLYGONAL POINT GENERATION SECTION
0112 ~ 0114
0106 ~ 0108
MICRO-COMPUTER CONTROL SECTION
0120
LUMINANCE SIGNAL GENETATION SECTION
0105
MICRO-COMPUTER
0119
A/D CON-VERTER
0102
SIGNAL PROCESSING CONTROL SECTION
0104
LUMINANCE/ COLOR SIGNAL SEPARATION CONTROL SECTION
0103
0101

FIG.16

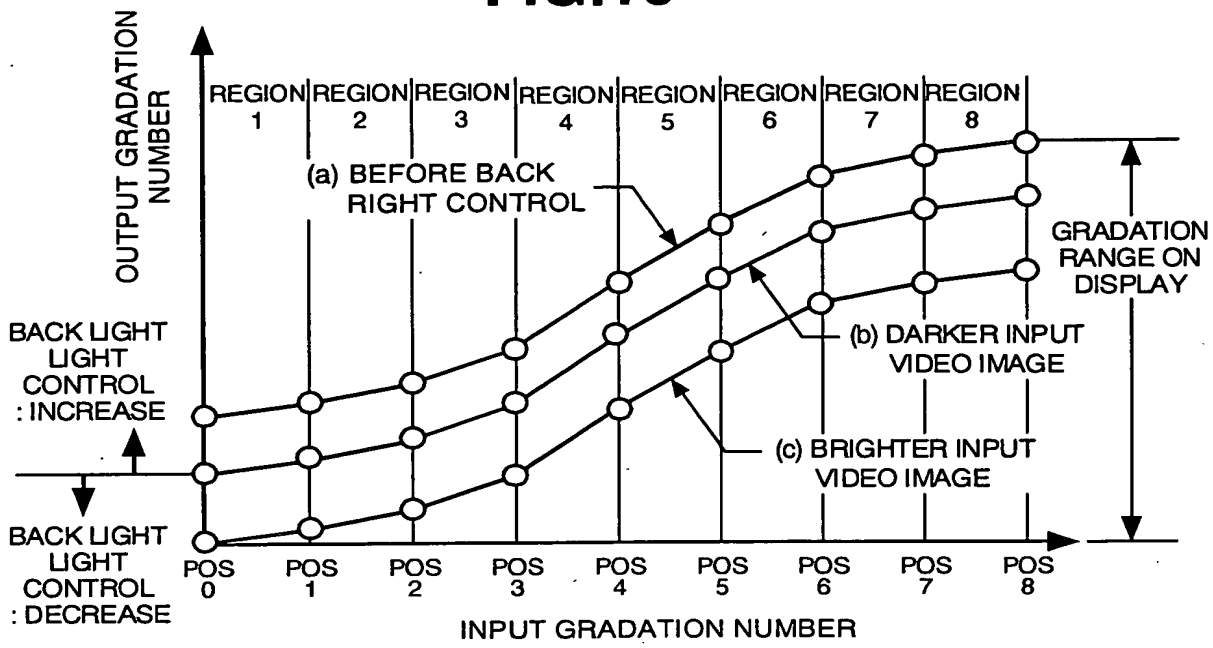

OUTPUT GRADATION NUMBER
REGION 1
REGION 2
REGION 3
REGION 4
REGION 5
REGION 6
REGION 7
REGION 8
(a) BEFORE BACK RIGHT CONTROL
GRADATION RANGE ON DISPLAY
(b) DARKER INPUT VIDEO IMAGE
(c) BRIGHTER INPUT VIDEO IMAGE
BACK LIGHT LIGHT CONTROL : INCREASE
BACK LIGHT LIGHT CONTROL : DECREASE
POS 0
POS 1
POS 2
POS 3
POS 4
POS 5
POS 6
POS 7
POS 8
INPUT GRADATION NUMBER

FIG.17

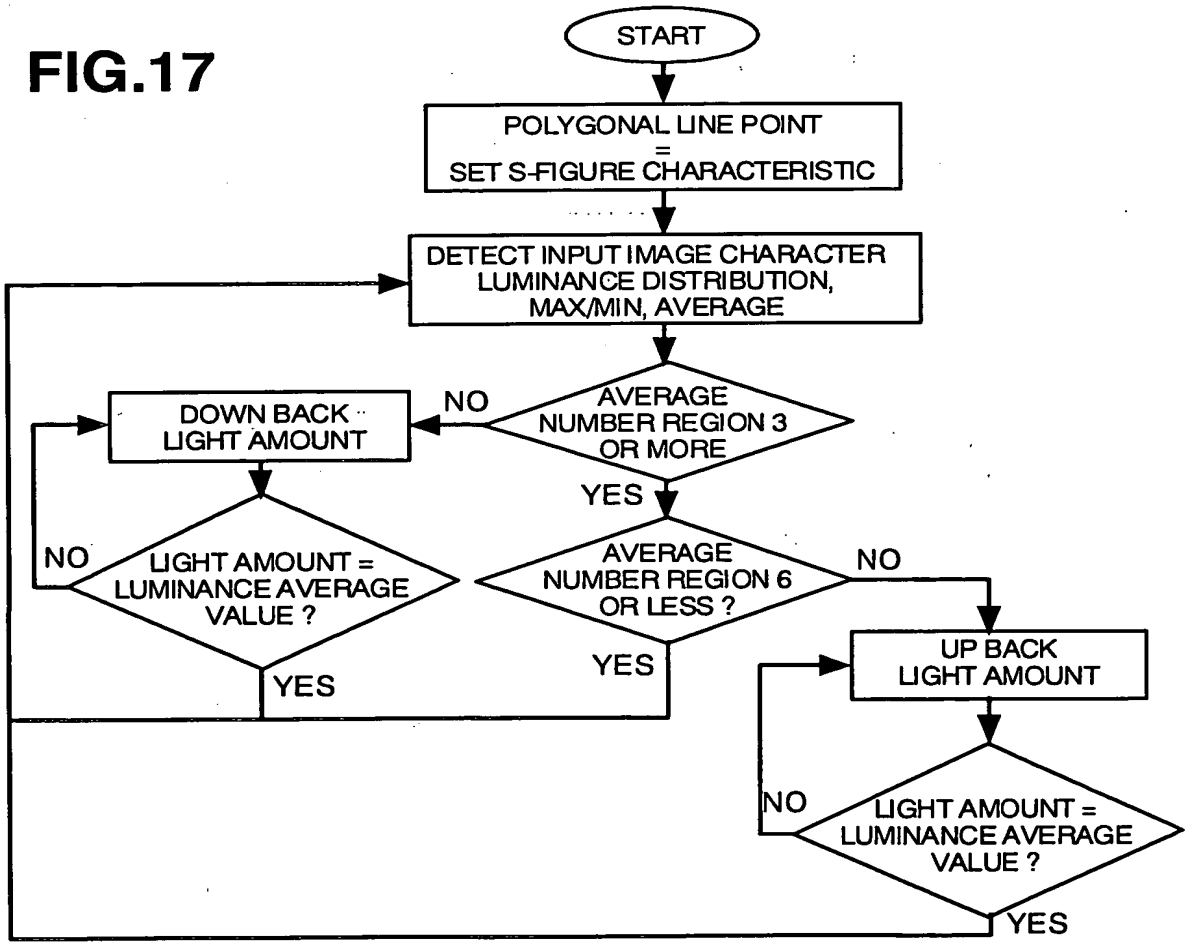

START
POLYGONAL LINE POINT = SET S-FIGURE CHARACTERISTIC
DETECT INPUT IMAGE CHARACTER LUMINANCE DISTRIBUTION, MAX/MIN, AVERAGE
AVERAGE NUMBER REGION 3 OR MORE
NO
DOWN BACK LIGHT AMOUNT
YES
LIGHT AMOUNT = LUMINANCE AVERAGE VALUE ?
NO
YES
AVERAGE NUMBER REGION 6 OR LESS ?
NO
YES
UP BACK LIGHT AMOUNT
LIGHT AMOUNT = LUMINANCE AVERAGE VALUE ?
NO
YES

FIG.18

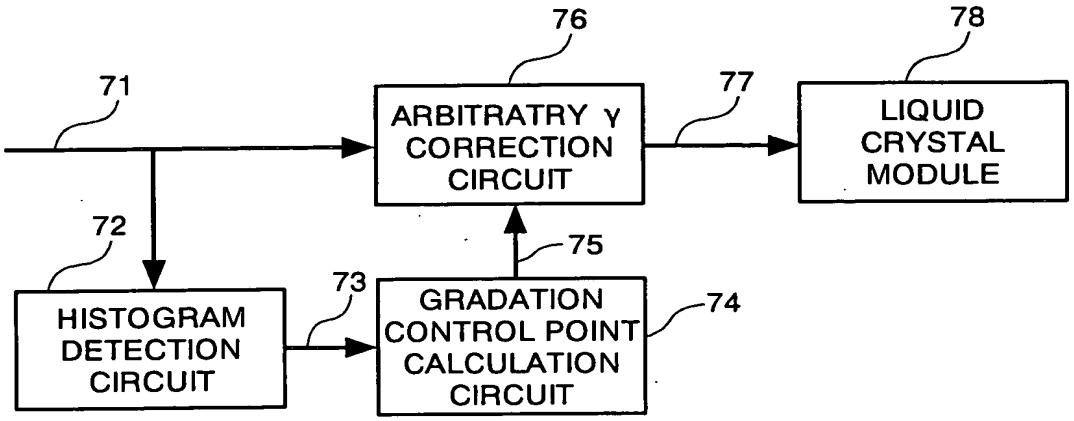

71
76
ARBITRATRY γ CORRECTION CIRCUIT
77
78
LIQUID CRYSTAL MODULE
72
HISTOGRAM DETECTION CIRCUIT
73
75
GRADATION CONTROL POINT CALCULATION CIRCUIT
74

FIG.19

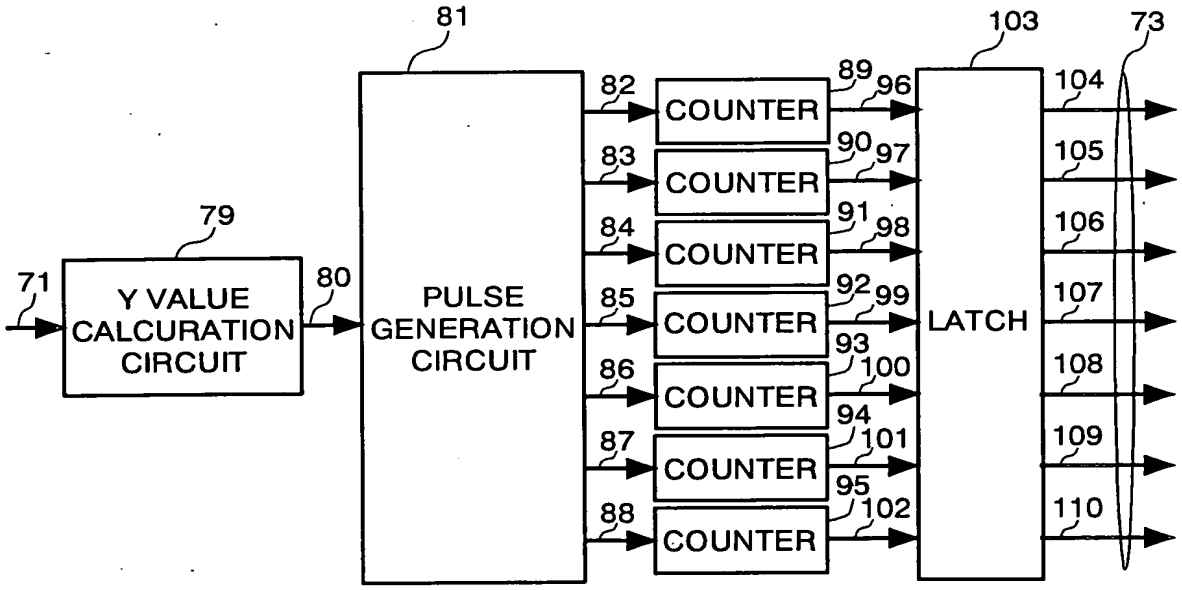

81
103
73
79
71
Y VALUE CALCURATION CIRCUIT
80
PULSE GENERATION CIRCUIT
82
83
84
85
86
87
88
COUNTER
89
90
91
92
93
94
95
96
97
98
99
100
101
102
LATCH
104
105
106
107
108
109
110

FIG.20

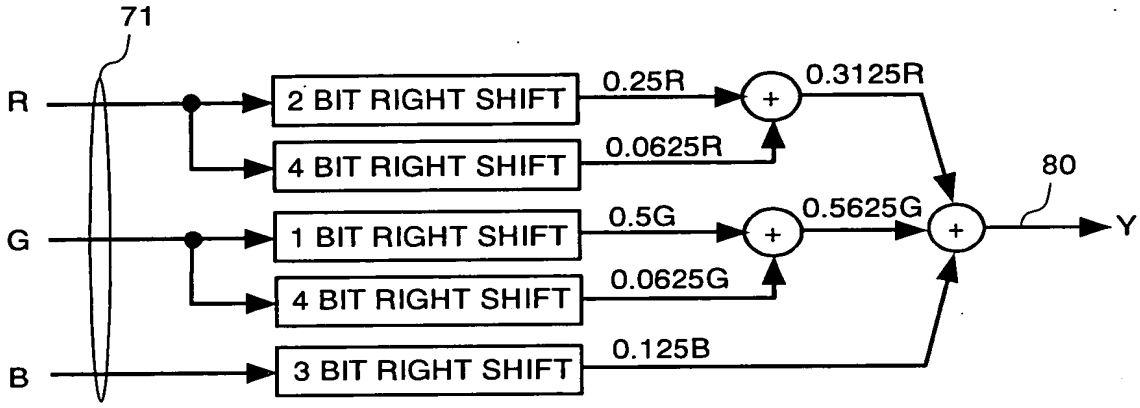

71
R
G
B
2 BIT RIGHT SHIFT
4 BIT RIGHT SHIFT
1 BIT RIGHT SHIFT
4 BIT RIGHT SHIFT
3 BIT RIGHT SHIFT
0.25R
0.0625R
0.5G
0.0625G
0.125B
+
+
+
0.3125R
0.5625G
80
Y

FIG.21

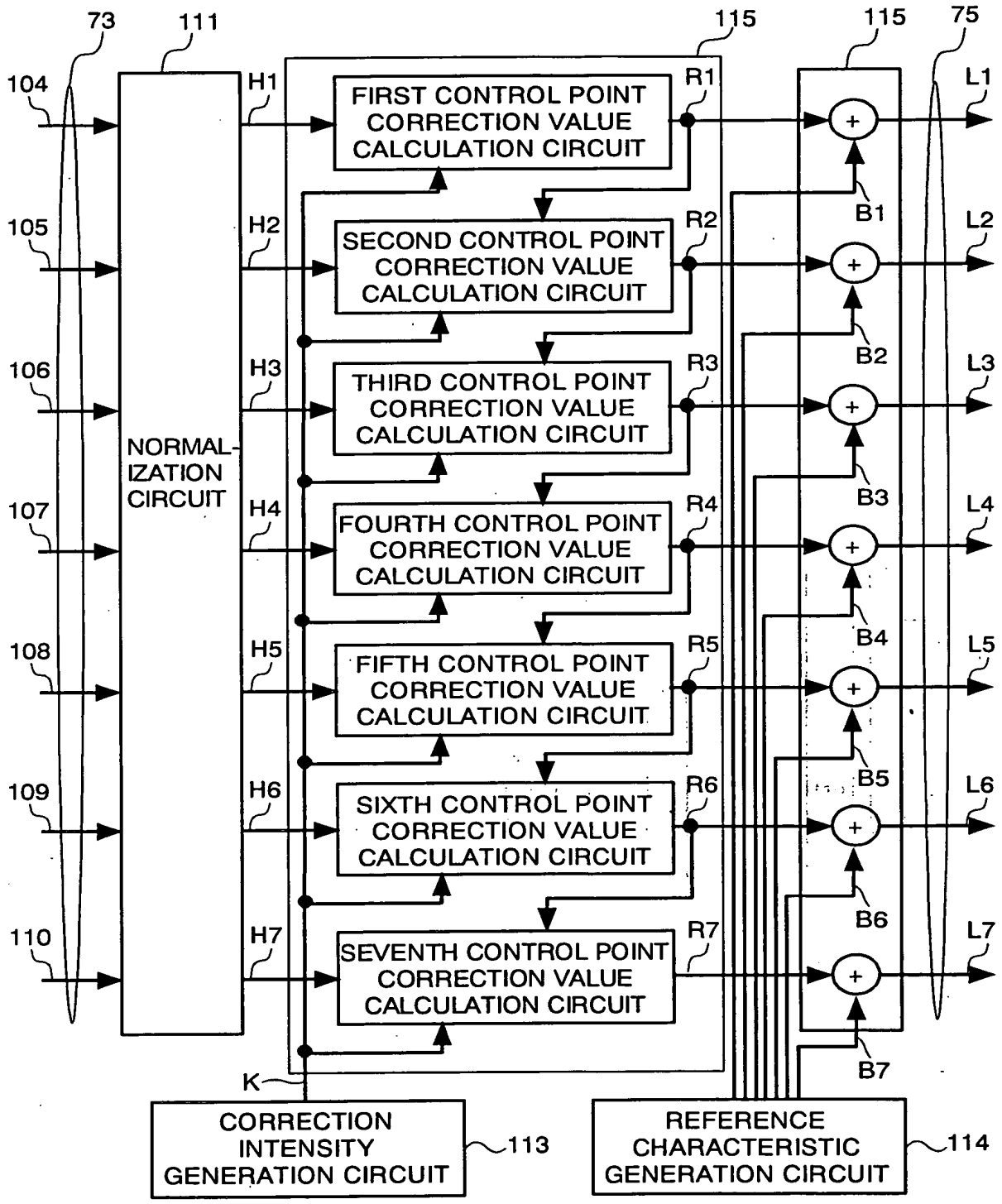

73
111
115
115
75
104
105
106
107
108
109
110
H1
H2
H3
H4
H5
H6
H7
NORMAL-
IZATION
CIRCUIT
FIRST CONTROL POINT
CORRECTION VALUE
CALCULATION CIRCUIT
SECOND CONTROL POINT
CORRECTION VALUE
CALCULATION CIRCUIT
THIRD CONTROL POINT
CORRECTION VALUE
CALCULATION CIRCUIT
FOURTH CONTROL POINT
CORRECTION VALUE
CALCULATION CIRCUIT
FIFTH CONTROL POINT
CORRECTION VALUE
CALCULATION CIRCUIT
SIXTH CONTROL POINT
CORRECTION VALUE
CALCULATION CIRCUIT
SEVENTH CONTROL POINT
CORRECTION VALUE
CALCULATION CIRCUIT
R1
R2
R3
R4
R5
R6
R7
B1
B2
B3
B4
B5
B6
B7
L1
L2
L3
L4
L5
L6
L7
K
CORRECTION
INTENSITY
GENERATION CIRCUIT
113
REFERENCE
CHARACTERISTIC
GENERATION CIRCUIT
114

FIG.22

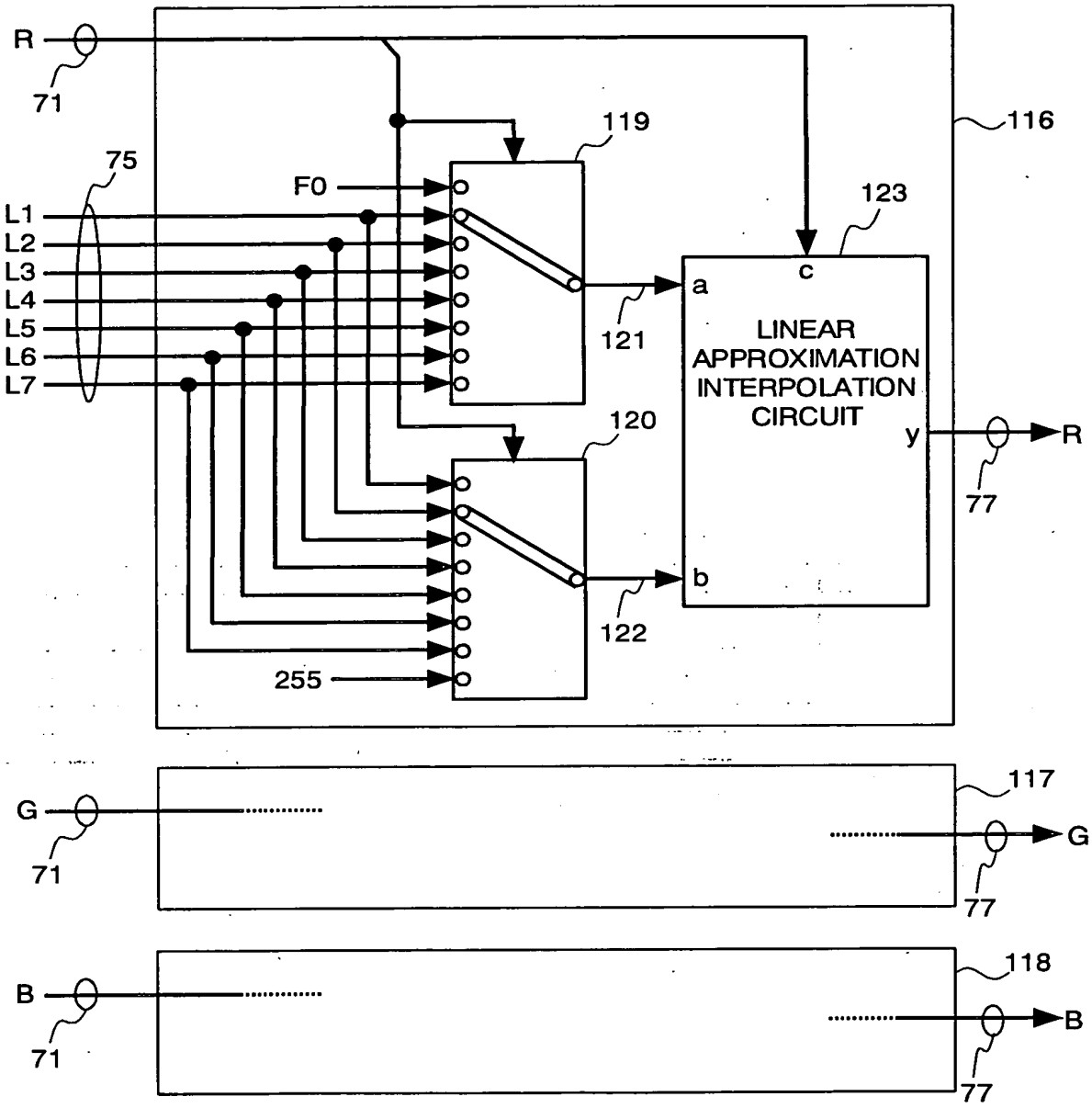

R
71
75
L1
L2
L3
L4
L5
L6
L7
F0
255
119
120
121
122
116
123
c
a
b
LINEAR
APPROXIMATION
INTERPOLATION
CIRCUIT
y
77
R
G
71
117
G
77
B
71
118
B
77

FIG.23

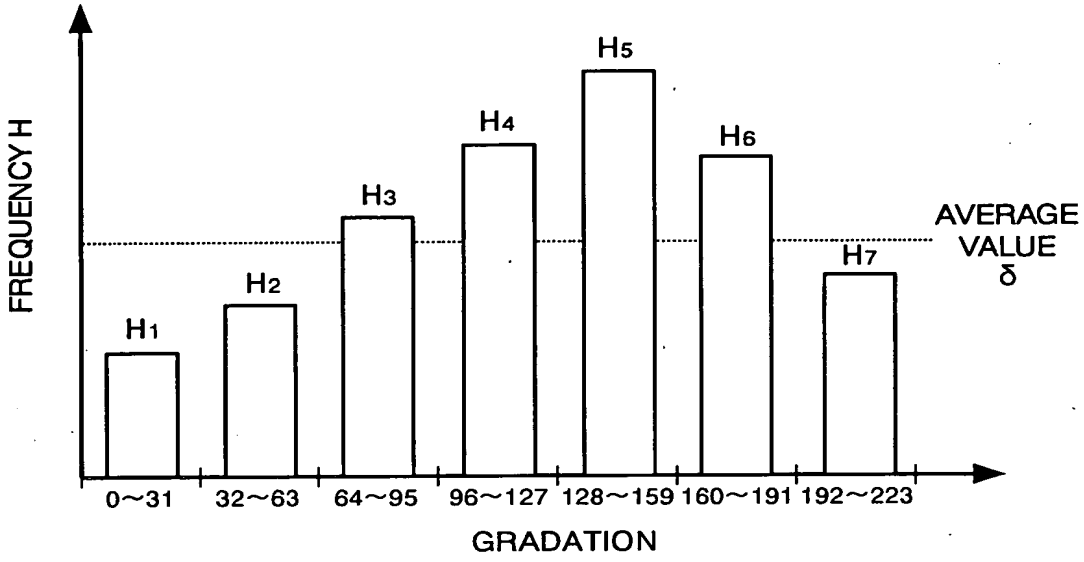

FREQUENCY H
H1
H2
H3
H4
H5
H6
H7
AVERAGE VALUE δ
0~31
32~63
64~95
96~127
128~159
160~191
192~223
GRADATION

FIG.24

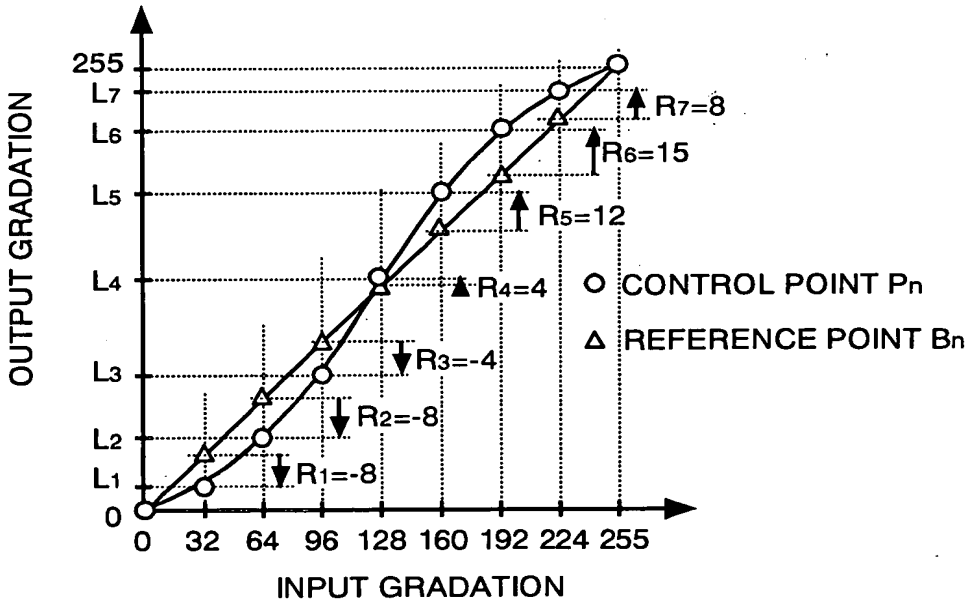

OUTPUT GRADATION
255
L7
L6
L5
L4
L3
L2
L1
0
R7=8
R6=15
R5=12
R4=4
R3=-4
R2=-8
R1=-8
CONTROL POINT Pn
REFERENCE POINT Bn
0 32 64 96 128 160 192 224 255
INPUT GRADATION

FIG.25

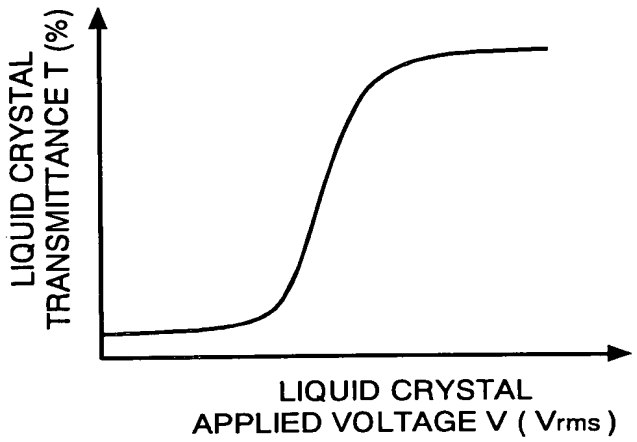


FIG.26

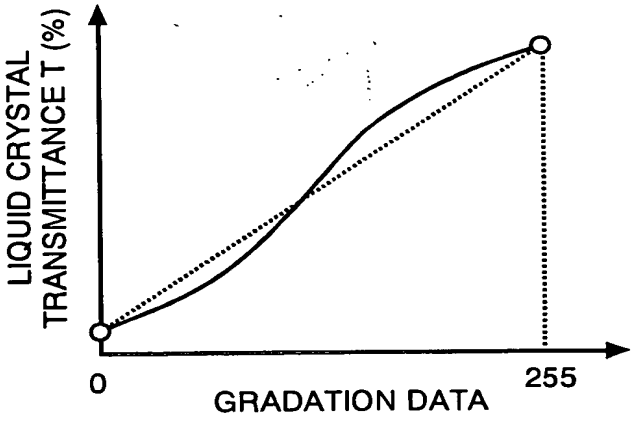


FIG27A

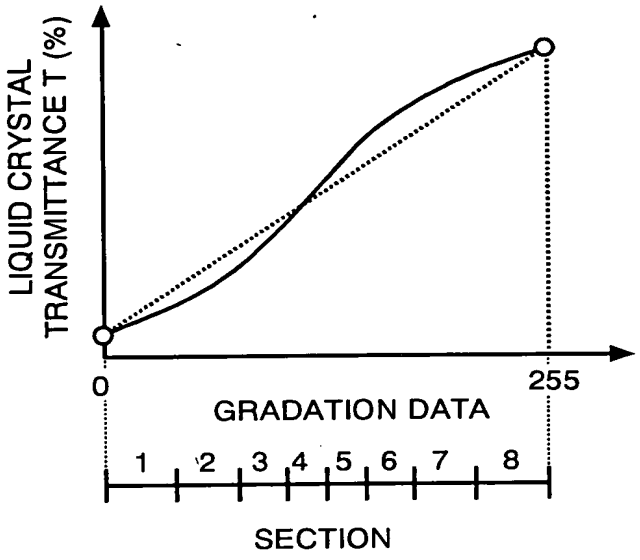


FIG27B

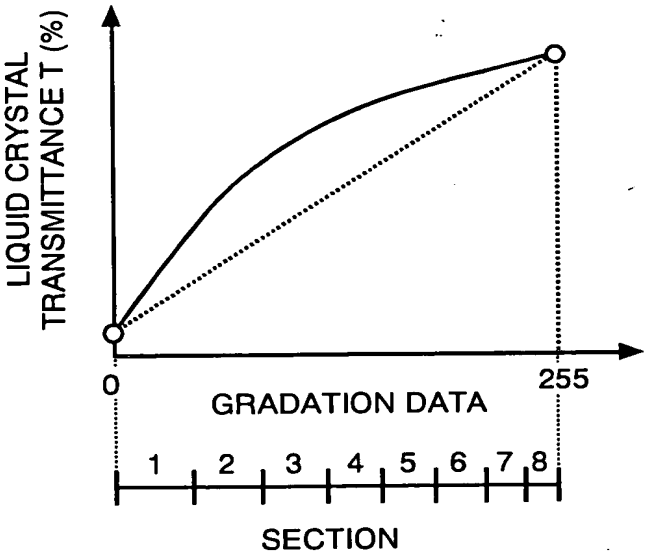


FIG.28

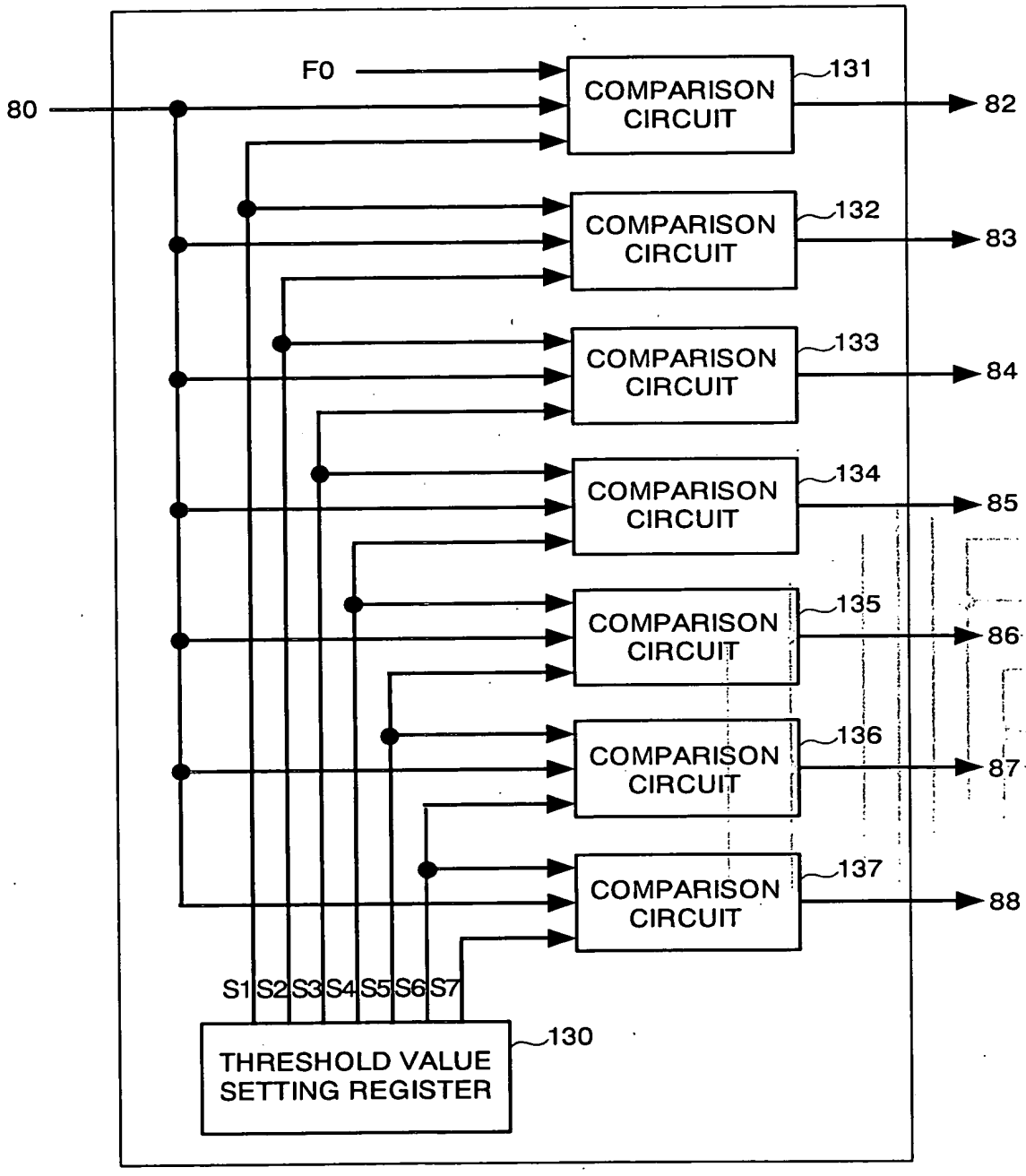

F0
80
COMPARISON CIRCUIT
131
82
COMPARISON CIRCUIT
132
83
COMPARISON CIRCUIT
133
84
COMPARISON CIRCUIT
134
85
COMPARISON CIRCUIT
135
86
COMPARISON CIRCUIT
136
87
COMPARISON CIRCUIT
137
88
S1 S2 S3 S4 S5 S6 S7
THRESHOLD VALUE SETTING REGISTER
130

FIG.29

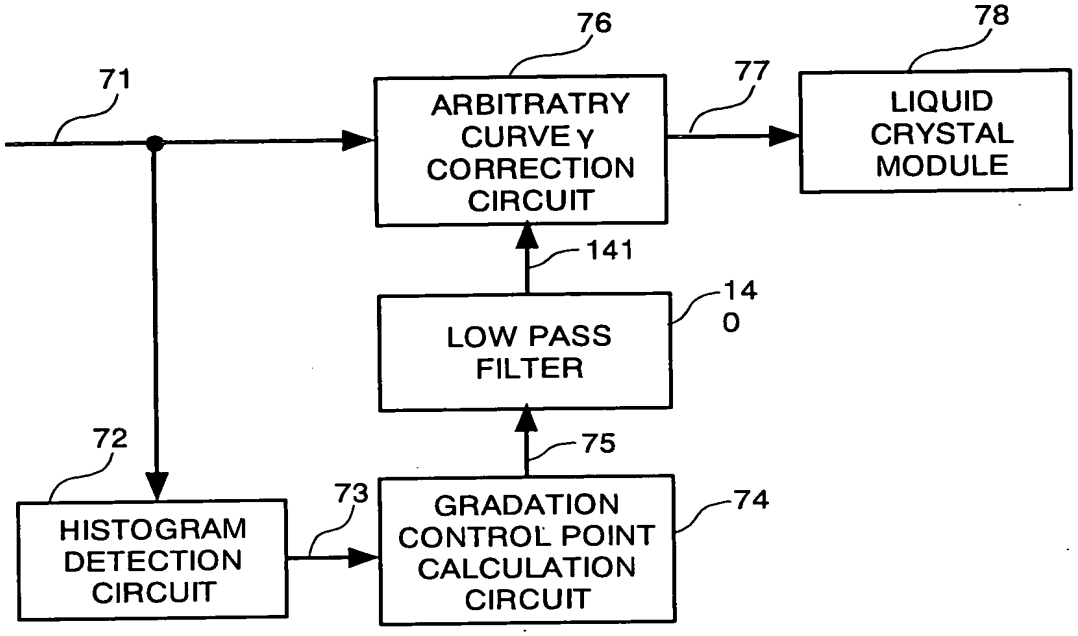

71
76
ARBITRATRY CURVE γ CORRECTION CIRCUIT
77
78
LIQUID CRYSTAL MODULE
141
140
LOW PASS FILTER
72
75
73
HISTOGRAM DETECTION CIRCUIT
GRADATION CONTROL POINT CALCULATION CIRCUIT
74

FIG.30

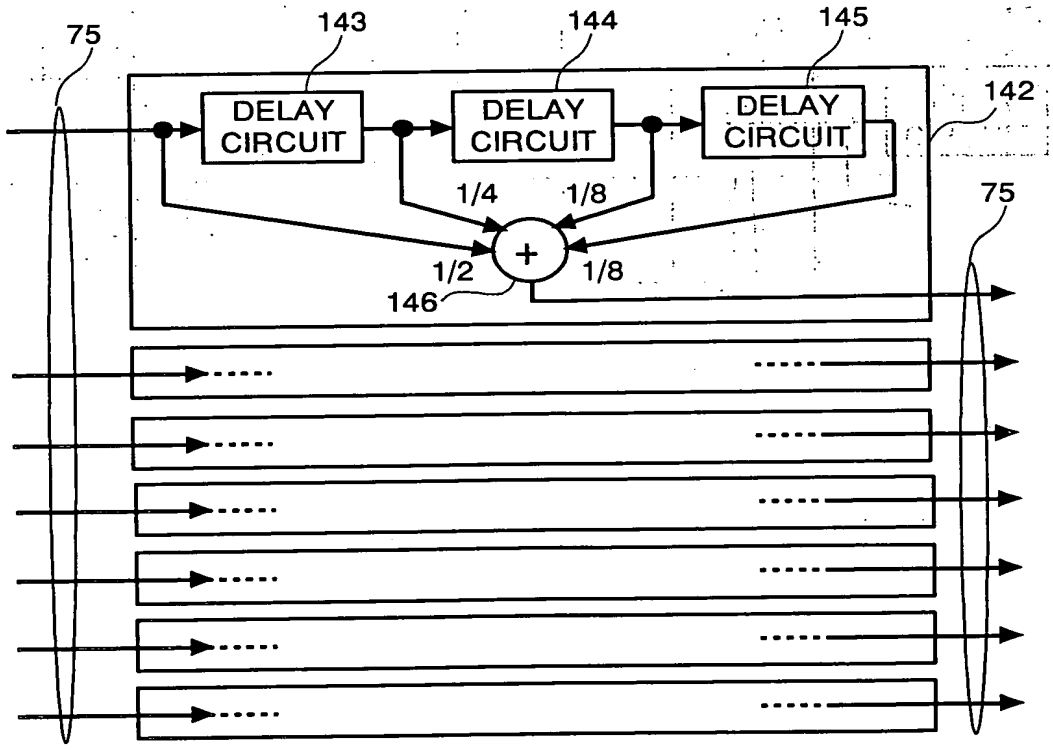

75
143
144
145
DELAY CIRCUIT
DELAY CIRCUIT
DELAY CIRCUIT
142
1/4
1/8
1/2
1/8
+
146
75

FIG.31

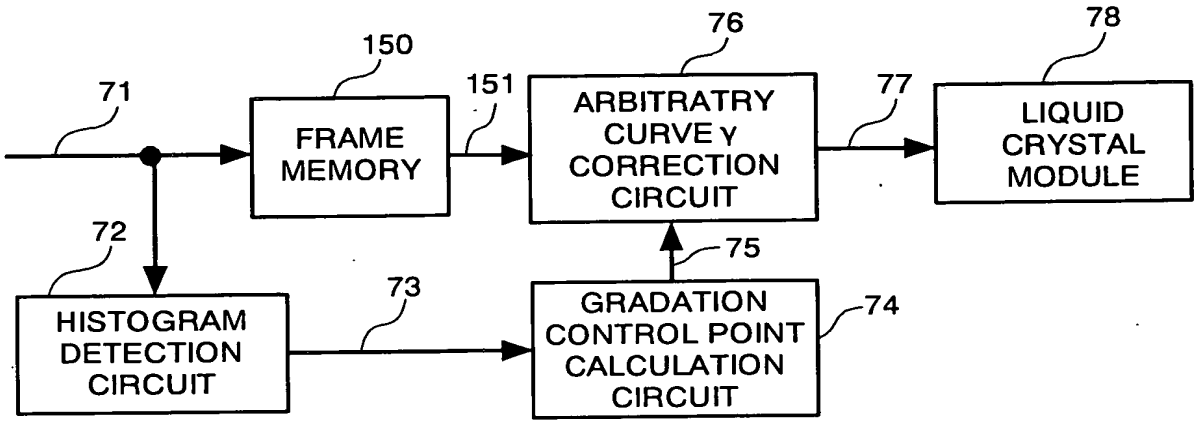

71
150
FRAME MEMORY
151
76
ARBITRATRY CURVE γ CORRECTION CIRCUIT
77
78
LIQUID CRYSTAL MODULE
72
HISTOGRAM DETECTION CIRCUIT
73
75
GRADATION CONTROL POINT CALCULATION CIRCUIT
74

FIG.32

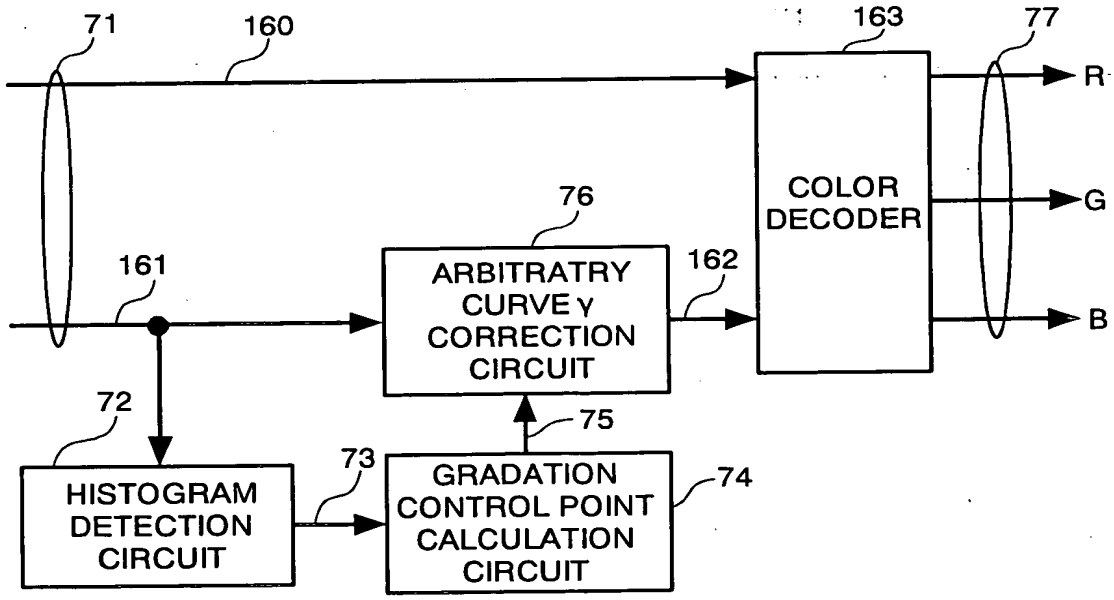
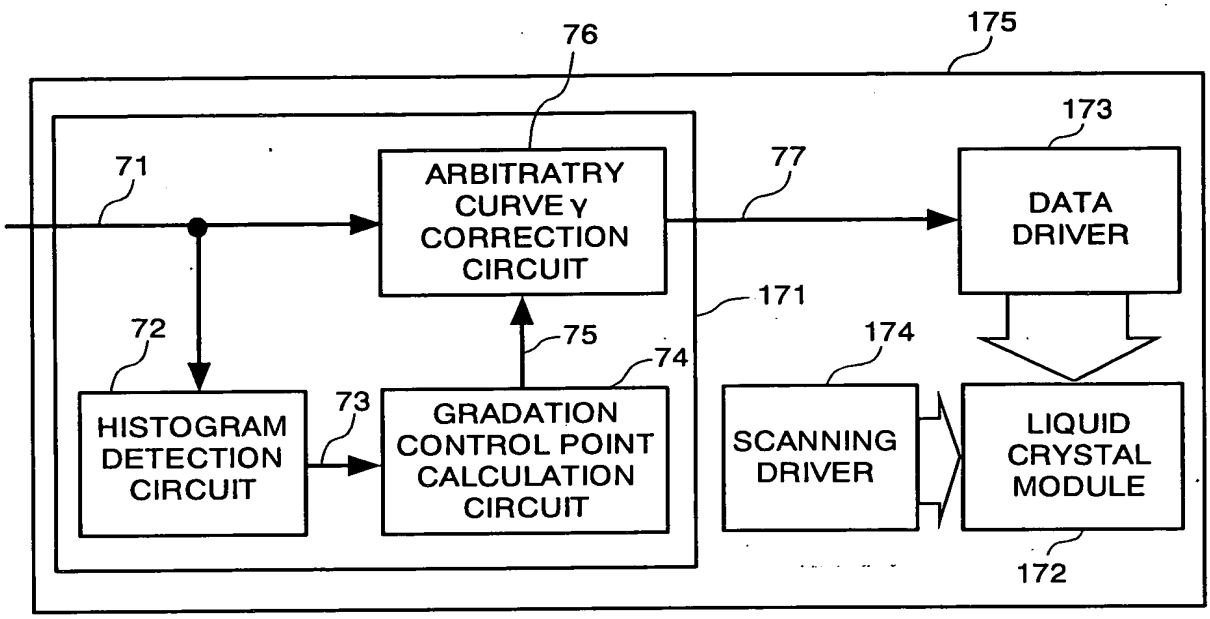

71
160
163
77
R
G
B
COLOR DECODER
76
161
ARBITRATRY CURVE γ CORRECTION CIRCUIT
162
72
HISTOGRAM DETECTION CIRCUIT
73
75
GRADATION CONTROL POINT CALCULATION CIRCUIT
74

FIG.33


76
175
173
71
ARBITRATRY CURVE γ CORRECTION CIRCUIT
77
DATA DRIVER
171
72
75
74
174
HISTOGRAM DETECTION CIRCUIT
73
GRADATION CONTROL POINT CALCULATION CIRCUIT
SCANNING DRIVER
LIQUID CRYSTAL MODULE
172